

# Invasive Plant Removal & Monitoring

SUMMARY OF INSTRUCTIONAL ACTIVITIES



## ● **The Private Life of Plants** - page 11

- ▶ Students watch *The Private Life of Plants* video and answer focus questions. (integrated assessment)

## ● **Mystery Plants** - page 15

- ▶ Students are introduced to the use of a dichotomous key by identifying the Mystery Plants on the National Park Labs web site.

## ● **Invasive Plant Removal & Monitoring** - page 19

- ▶ In small groups, students perform qualitative and quantitative monitoring of a restoration site.
- ▶ Students identify and remove invasive plants from a restoration site.
- ▶ Students calculate the rate of weeding for their group and use that calculation to estimate how many people-hours it will take to weed all the restoration sites in the park.
- ▶ Students discuss the contributions of volunteers in national parks.
- ▶ Students write a journal entry predicting the impact of removing invasive plants from the restoration area. (integrated assessment)

## ● **Community Forum Role Play** - page 29

- ▶ In *The Case of the Vacant Lot* students play the roles of different community members during a planning process for a fictional deserted lot near their school.
- ▶ Students reflect on the Environmental Justice issues addressed in the planning process and write journal entries about the role-play activity. (integrated assessment)

## ● **Habitat Restoration Around the World** - page 47

- ▶ Students read articles about habitat restoration projects in other parts of the world.
- ▶ Students discuss articles and answer focus questions.

# Standards

## Invasive Plant Removal & Monitoring

### **SFUSD Science Content Standard 14: Interdependence**

Students understand that the maintenance of ecosystems depends upon biotic and abiotic factors, including the effects of water, nitrogen, and carbon cycles on the system.

- ▶ *Performance Standard:* Students recognize that indigenous and exotic plants interact differently with abiotic and biotic components of the ecosystem (based on SFUSD Performance Standard 14.3).

### **SFUSD Math Content Standard 1: Number and Operations**

Students demonstrate their knowledge of basic skills, conceptual understanding, and problem solving in number and operations.

- ▶ *Performance Standard:* Students use number sense and estimation skills in determining the number of volunteer hours necessary to complete projects within the park (based on SFUSD Performance Standard 1.1).

### **National Behavioral Studies Standard 4: Conflict, cooperation, and interdependence among individuals, groups, and institutions**

Students understand that conflict between people or groups may arise from competition over ideas, resources, power, and/or status.

- ▶ *Performance Standard:* Students understand that decisions regarding open space may cause conflict between people who compete for access to the resource.

### **National Life Skills Standard: Contributes to the overall effort of a group**

Students demonstrate respect for others in the group, take initiative when needed, engage in active listening, and contribute to the development of a supportive climate in group.

- ▶ *Performance Standard:* Students can contribute effectively to their groups during park and classroom group activities.

# Exotic Plants

## WHAT ARE EXOTIC PLANTS?

The National Park Service defines exotic or "non-native" species as those occurring in a given place as a result of deliberate or accidental actions by humans. Exotic plants have been introduced to North America for a variety of reasons, including livestock grazing, agriculture, forestry, ornamental landscaping, and soil stabilization.

The exchange of food plants around the world has immeasurably enriched human cultures. Potatoes, peppers, chocolate, and tomatoes, once found only in Central and South America, now thrive in gardens around the world. These species evolved on continents where their populations were kept in check by various environmental factors such as climate, disease, and herbivores. However, when they arrive in a new environment free of such ecological constraints, many become weeds along roadsides and in other disturbed areas. Some spread into natural areas, and a number of these can be classified as invasive. Exotic invasive plants dramatically reduce biodiversity by covering extensive areas so completely that other species cannot co-exist.

The spread of invasive species is one of the worst threats to biological diversity in National Parks. For example, more than 1,000 acres in Everglades National Park are lost every year to the Brazilian pepper tree and other invasive species that spread rapidly through the wildlands. Iceplant, a threat to the natural areas of California, forms thick mats in California's coastal sand dunes. Very few indigenous plants can co-exist in this iceplant monoculture. Iceplant was brought to California from South Africa more than a hundred years ago to stabilize soil and prevent sand movement across roads. Researchers have since learned its faults as a soil stabilizer and invasive weed, but too late to prevent its spread throughout coastal California.

The park targets iceplant for removal, not just because of its status as an exotic species, but because it is invasive. It is not naturally a "bad" plant. Iceplant became problematic in California due to lack of predators. Natural resource managers, needing to control the worst invasive species, remove iceplant from areas where it directly threatens endangered species habitat. Other exotic species that successfully co-exist with natives are left in place, and have become a permanent element of the California flora.

Many invasive species share biological characteristics that enable them to spread rapidly. Among these are:

- ▶ Exceptional reproductive abilities including vegetative reproduction (from stems, roots, or both), massive seed production, and extremely effective seed dispersal methods.
- ▶ Adaptation to frequent disturbance.
- ▶ Ability to survive in highly compacted or low-nutrient soils.
- ▶ Ability to produce chemicals that inhibit growth of nearby vegetation.

## Monitoring

Natural resource managers need a systematic method to record information and detect changes that occur in natural systems over time: year after year, season after season, or at some other regular time interval. Monitoring is the regular collection and analysis of data at regular intervals over time, to predict or detect natural and human-induced changes, and to provide the basis for appropriate management response. The collection of baseline information on natural resources, as well as the initiation of long-term monitoring programs to alert management to changes, are essential parts of the natural resource program in a national park. In Golden Gate National Recreation Area, park staff monitor approximately 2 percent of a site. This conforms to constraints in time and personnel. There are many different methods of monitoring. Specific management objectives determine which method is used.

### QUALITATIVE MONITORING

Qualitative monitoring tracks the quality of the natural resources in a site. The quality of natural resources includes plant health and size, as well as the general appearance of an area. Photomonitoring is one type of qualitative monitoring. Photomonitoring (as opposed to random picture taking) is the photographing of a site from precise documented locations at specific times of the year. The purpose of this form of monitoring is to visually document the changes in a landscape over a period of time. By photographing at the same time of year, seasonal changes are eliminated from the documentation. In addition to these monitoring photos, many sites in the park have a site journal in which the stewards of that area record in writing and drawings the changes that occur.

## **QUANTITATIVE MONITORING**

Quantitative monitoring is used to get more detailed information about changes in an area. Information on the diversity of plant or wildlife species, or the number of individuals of a particular species, may be gathered. Use of a vegetative transect is one method of quantitative monitoring. Transects require precision and consistency. During transect monitoring, plants are sampled every one-fifth of a meter for 10 meters, using a sampling rod. Any plant species touching the rod at a given point is recorded. Plants are identified using a dichotomous key and the information is recorded. The percentage of cover for each species found on the transect can then be calculated.

Another method of quantitative monitoring is quadratic monitoring. A quadrat is a rectangle of one square meter or less. The quadrat is placed randomly in the site and information regarding the percent cover of each species that lies within the quadrat is recorded.

# Plantas Exóticas

## **¿QUÉ SON PLANTAS EXÓTICAS?**

El Servicio Nacional de parques define especies exóticas ó "no-nativas" como aquéllas que se dan en un lugar en particular, como resultado de las acciones deliberadas o accidentales de parte de los humanos. Las plantas exóticas han sido introducidas en Norteamérica por una variedad de razones, incluyendo pastizales para el ganado, agricultura, forestación, paisajes artificiales y estabilización del terreno.

El intercambio de plantas por todo el mundo ha enriquecido inmensamente las culturas humanas. Las patatas o papas, la pimienta, el cacao (chocolate) y los tomates, que antes existían solo en América Central y Sur América crecen ahora en huertos en todo el mundo. Estas especies evolucionaron en continentes donde sus poblaciones fueron controladas por varios factores ambientales, como el clima, las enfermedades y los animales herbívoros. Sin embargo, cuando llegaron a nuevos ambientes que no tenían tales limitaciones ecológicas muchas se convirtieron en hierbas creciendo a la orilla de los caminos y en otras áreas afectadas. Algunas se difundieron por áreas naturales y un número de éstas pueden ser clasificadas como invasoras. Las plantas exóticas invasoras redujeron la diversidad dramáticamente al cubrir grandes áreas de manera tan extensa que otras especies no lograron co-existir con ellas.

La difusión de especies invasoras es una de las peores amenazas a la diversidad biológica en los parques nacionales. Por ejemplo, más de 1,000 acres de los Everglades de Florida se pierden todos los años debido al árbol Brasileño de pimienta y otras especies invasoras que se difunden rápidamente por las tierras silvestres. El Iceplant, una amenaza a las áreas naturales de California, forma gruesas alfombras en las dunas costeras de California. Muy pocas plantas indígenas pueden coexistir con este monocultivo del Iceplant. El Iceplant fue traído a California de África del Sur hace más de cien años, para estabilizar el terreno y evitar que la arena se moviera hacia las carreteras. Los investigadores desde entonces descubrieron sus defectos como estabilizador de terreno y por ser hierbas invasoras, aunque muy tarde para prevenir su difusión por toda la costa de California.

El parque tiene como objetivo remover el Iceplant, no solo por ser una especie exótica sino porque es invasora. No es en términos naturales, una planta "dañina." El Iceplant se convirtió en un problema en California debido a que ésta no tiene enemigos naturales (depredadores). Los manejadores de recursos naturales, quienes necesitan controlar las especies invasoras más dañinas, remueven el Iceplant de áreas donde esta amenaza directamente los hábitats de especies en peligro de extinción.

Otras plantas exóticas que coexisten exitosamente con las plantas nativas se dejan en el lugar y se han convertido en elementos permanentes de la flora de California.

Muchas plantas invasoras comparten características biológicas que les permite difundirse rápidamente. Algunas de estas características son:

- ▶ Capacidad de reproducción excepcional, incluyendo reproducción vegetativa (de tallos, raíces o ambos), producción masiva de semillas y métodos de dispersión muy efectivos.
- ▶ Adaptación a perturbaciones frecuentes.
- ▶ Capacidad para sobrevivir en terreno muy compacto o bajo en nutrientes.
- ▶ Capacidad para producir sustancias químicas que inhiben el crecimiento de la vegetación vecina.

## Monitoreo (Supervisión)

Los manejadores de recursos naturales dependen de un método sistemático para recoger información y detectar los cambios que se dan en sistemas naturales a través del tiempo: año tras año, temporada tras temporada o a cualquier otro intervalo regular. Monitoreo es la recopilación y análisis de datos a intervalos regulares a través del tiempo, para predecir o detectar cambios naturales o inducidos por seres humanos y para proveer una base para responder con la acción apropiada. La recopilación de información que sirva de base, sobre recursos naturales, así como el inicio de programas de monitoreo a largo plazo para alertar a los administradores sobre cambios, son parte esencial del programa de recursos naturales de una Parque Nacional. En el Área Nacional Recreativa Golden Gate el personal del parque supervisa aproximadamente un 2% de un lugar específico. Esto se debe a limitaciones de tiempo y personal. Hay muchos y diversos tipos de monitoreo. Los objetivos administrativos específicos determinan qué método se va a utilizar.

### **MONITOREO CUALITATIVO**

El monitoreo cualitativo evalúa la calidad de los recursos naturales en un lugar específico. La calidad de los recursos naturales incluye el tamaño y estado de salud de la planta y la apariencia general del área. Monitoreo con fotografías (photomonitoring) es un tipo de monitoreo cualitativo. El monitoreo con fotografías (a diferencia de tomar fotos al azar) es tomar fotos de un lugar desde puntos documentados con precisión en momentos específicos del año. El propósito de esta forma de mon-

itoreo es documentar visualmente los cambios en el paisaje a través del tiempo. Tomando fotos en la misma época del año, los cambios debidos a cambios en temporada son eliminados de la documentación. Aparte de estas fotos documentales, muchos lugares del parque mantienen un registro en el cual los encargados de esas áreas anotan e ilustran con dibujos los cambios que se dan.

### **MONITOREO CUANTITATIVO**

El monitoreo cuantitativo se usa para obtener información más detallada de los cambios en un área. Se puede recoger información acerca de la variedad de plantas o especies de vida silvestre, o sobre el número de individuos de una especie en particular. El uso de tractos o segmentos vegetativos es uno de los métodos de monitoreo cuantitativo. El uso de tractos requiere precisión y consistencia. Cuando se realiza monitoreo por tractos se toman muestras de las plantas cada quinta parte de un metro por diez metros, usando un vara de muestreo. Cualquier especie de planta que toque la vara en un punto dado es anotada. Las plantas son identificadas y se registra la información utilizando una clave dicotómica (dos partes). El porcentaje que cubre cada especie hallada en el tramo puede entonces ser calculada.

Otro método de monitoreo cuantitativo es monitoreo cuadrático. Un cuadro (quadrat) es un rectángulo de un metro cuadrado o menos. El cuadrado se coloca al azar en el lugar y se registra la información sobre el porcentaje cubierto por cada especie que cae dentro del cuadro.

# 外來植物

## 什麼是外來植物？

國家公園服務部將那些在特定的地點經由人類蓄意或偶然行為所帶來的產物定義為外來或“非本地”品種植物。很多外來植物由於各種原因而被引進北美，例如用來發展農業、放牧、造林、裝飾造景及穩固土壤等。

世界各地所進行的食品植物交換大幅度地充實了人類文化。薯仔、辣椒、朱古力和西紅柿等，從前是中南美洲的特產，現在卻在全球各地的菜圃中繁殖。這些品種在大陸演化，但是受到如氣候、病害和草食動物啃食等各種環境因素的限制，無法大量繁殖。不過，當它們來到一個沒有這類生態限制的新環境時，便成為雜草，在路旁和其他天然災害蹂躪的地區叢生蔓延。一些蔓延到自然區域，其中又有一些可以歸類為侵佔性植物。外來的侵佔性植物完全覆蓋了廣大的區域，其他的植物品種根本無法與之共存，也因此大大的降低了生物多元性。

侵佔性品種不斷繁衍擴生，對國家公園的生物多元性帶來了很大的威脅。舉例來說，Everglades 國家公園每年都有一千多英畝的地被巴西辣椒樹和在野地裡快速繁殖的其他品種侵佔。冰葉日中花威脅到加州的自然區域，在加州的海岸沙丘長成厚厚的蒲葦叢。只有很少數的本地植物可以和冰葉日中花共存。冰葉日中花是一百多年以前從南非帶進加州用來穩固土壤，防止沙土橫跨路面的植物。研究家後來發現它是一種侵佔性的野草，不適合用來穩固土壤，但是已來不及阻止它在整個加州沿海地區蔓延。

公園當局一直將冰葉日中花列為清除的目標，不只因為它是外來品種，也因它具有侵佔性。雖然它本身並非“不好的”植物。因為沒有其他靠啃食冰葉日中花而生存的動物來將它清除，冰葉日中花成為加州最頭痛的一個大問題。為了及時控制這種影響最深的侵佔性品種的蔓延，自然資源管理人士便從直接危害到瀕臨絕種的植物棲息區將冰葉日中花清除。其他能與本地植物共存的外來品種都被保留下來，已成為加州植物的永久成員。

很多侵佔性品種都具有可以快速繁殖蔓延的生物特徵。其中包括：

- ▶ 不尋常的繁殖能力，包括營養生殖方式（從莖、根或兩者），產生大量的種籽，以及極為有效的種籽傳播方法。
- ▶ 對經常性的干擾的適應力。
- ▶ 可以在非常擁擠或貧脊的土壤中生存。
- ▶ 可以製造化學成份，會抑制附近植被的生長。

## 監視

自然資源管理人士需要一套有系統的方法來記錄資料並且偵測自然系統隨著時序的移轉所發生的變化：年復一年，季節輪替，或是其他定期間隔時段。監視是指在一段時間內，定期收集和分析資料，以便預測或偵測天然和人為變化，並作為採取適當管理措施的依據。天然資源基礎資料的收集和長期監視計劃的實施以提高管理階層的警覺，從而因應所面臨的變化等，都是一個國家公園的自然資源計劃重要的一部份。在金門國家康樂區，公園員工負責監視一塊生態重建地大約百分之二的部份。這麼低的百分比，是由於時間有限，人力也不足。監視方法有很多種，要根據特定的管理目標來決定採用哪一種方法。

### 質量監視

質量監視追縱生態重建地自然資源品質。自然資源的品質包括植物的健康和大小，以及一個地區的一般地貌。攝影監視是一種質量監視。攝影監視（相對於隨機照相）是在一年的特定時間內，從一個有記錄設備的地點，對一塊生態重建地所做的攝影監視。這種監視方式旨在以視覺的方法記錄一個風景地帶在一段時間之內的變化。通過在每一年的同一個時間的攝影監視，毋須顧慮季節性的變化。除了這些監視攝影之外，公園內很多生態重建地都有一份日誌，公園員工用書寫和繪圖的方式，記載發生的所有變化。

### 數量監視

數量監視是用來取得有關一個地區變化的詳細資料。可以收集有關植物或野生物品種的多元性，或是一特定品種的數目等資料。數量監視的一種方法是使用一個植物營養生殖的樣條。使用樣條時要精確一致。在進行樣條監視時，用一個樣條在每十公尺的距離內就採樣

五分之一公尺的植物，並把在特定的地點接觸樣條的植物品種記錄下來。從二叉式檢索表上找到植物，並記錄相關資料。最後計算出樣條上找到的每一個品種的覆蓋面百分比。

另一種數量監視的方法就是樣方監視。樣方是一塊大約一平方公尺大小的長方形地。隨意在生態重建區內找出一塊像這樣的地皮，並記錄有關每一個品種在此樣方內的覆蓋面百分比資料。

# ● The Private Life of Plants

## SUMMARY

Students watch the video, *The Private Life of Plants*, and answer discussion questions. The video explains how certain plants disperse their seeds with the assistance of biotic and abiotic components of the environment. Through the focus questions, students begin to understand that plants have many ways of dispersing seed, utilizing wind, water, and animals.

## TIME

Two 50-minute class periods  
15 minutes for preparation

## MATERIALS

- ▶ Discussion questions
- ▶ *The Private Life of Plants* video (provided by the NPS)

# ○ Lesson

## Day 1

5 minutes

Students read the discussion questions.

45 minutes

Before starting the video teacher asks the students to pay particular attention to issues of interdependence depicted in the video. Students watch the video.

## Day 2

15 minutes

Students answer the discussion questions.

25 minutes

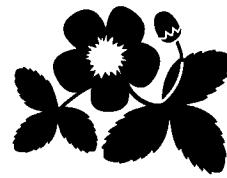
Students discuss their answers to the discussion questions.

10 minutes

Students formulate two questions they have about the video. Students enter these questions into their journals.

# Private Life of Plants

## Discussion Questions



1. What are four different ways plants disperse their seeds?

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2. Usually, we think of animals as dependent on plants. The video shows plants that depend on specific animals for the survival of the species. Give one example of a plant that depends on an animal to disperse its seed.

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3. The video shows many complex interactions between abiotic and biotic components of the environment. Describe how a severe drought would affect the interactions in a normally wet ecosystem.

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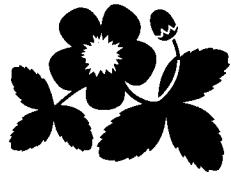
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# Vida Individual de las Plantas

## Preguntas sobre Opiniones



1. ¿De qué cuatro maneras las semillas se dispersan?

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2. Por lo general consideramos que los animales dependen de las plantas. La videocinta muestra plantas que dependen de animales específicos para que su especie sobreviva. De un ejemplo de una planta que depende de un animal para dispersar sus semillas.

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3. La videocinta muestra muchas interacciones complejas entre los componentes bióticos y abióticos del ambiente. Describa como una sequía severa afectaría las interacciones en un ecosistema que normalmente está mojado.

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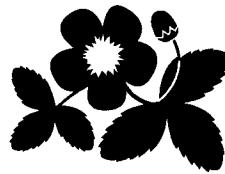
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# 植物的“私生活”

討論問題



1. 植物傳播種籽有哪四種方法？

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2. 我們通常認為動物是要依賴植物為生。錄影帶指出，植物亦需要依靠動物才可以生存。舉出一個植物依靠一種動物來傳播種籽的例子。

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3. 錄影帶指出環境中的無生命成份和有生命的成份之間，會發生很多複雜的互動。說明嚴重的乾旱會如何影響一般潮濕地帶的生態系統成員之間的互動關係。

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# ● Mystery Plants

## SUMMARY

Students are introduced to the process of using a dichotomous key by investigating the Mystery Plant section of the National Park Labs web site.

## TIME

50 minutes

10 minutes for preparation

## MATERIALS

- ▶ Computers with Internet access
- ▶ Mystery Plants Worksheet

# ○ Lesson

## Introduction - 5 minutes

Teacher explains to the students that a dichotomous key is an important tool used by biologists to identify plants. The user of a dichotomous key must answer a series of questions about the plant he/she is trying to identify. Some of the questions are easy to answer but some take knowledge of plant biology or special vocabulary.

Identifying the Mystery Plants on the National Park Labs web site will help students understand how to use a dichotomous key and learn some of the terms necessary to identify plants.

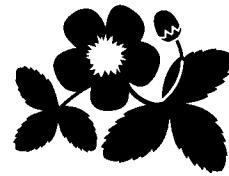
## Mystery Plant Worksheet - 35 minutes

Teacher distributes the Mystery Plants Worksheet. Students access the National Park Labs web site. Students complete the worksheet as they identify the Mystery Plants.

## Conclusion - 10 minutes

The class discusses the process of identifying plants. What kinds of things need to be observed in order to identify a plant? What new terms did students learn? Students will use their observation skills and their new vocabulary when they identify which plants to remove during their next visit to Golden Gate National Recreation Area.

# Mystery Plants Worksheet



- Go to Golden Gate National Recreation Area's National Park Labs web site: [www.nps.gov/goga/parklabs](http://www.nps.gov/goga/parklabs).
- Locate the section titled Can YOU Use a Dichotomous Plant Key?

At each step in a dichotomous key you are asked to choose between \_\_\_\_\_ for the plant you're trying to identify.



## Mystery Plant #1

What is a simple leaf? \_\_\_\_\_

What is the common name for this plant? \_\_\_\_\_



## Mystery Plant #2

What is an inflorescence? \_\_\_\_\_

What is the Latin name for this plant? \_\_\_\_\_



## Mystery Plant #3

What are rhizomes? \_\_\_\_\_

Draw a picture of this plant on the back of this page.



## Mystery Plant #4

What are dissected leaves? \_\_\_\_\_

This plant is a member of what family? \_\_\_\_\_

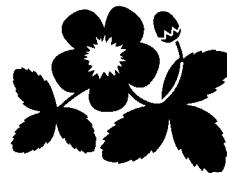


## Mystery Plant #5

What are pedicels? \_\_\_\_\_

In what part of the world does this plant originate?  
\_\_\_\_\_

# Las Plantas Misteriosas



Llegue hasta la dirección electrónica del Laboratorio Nacional del Área Nacional Recreativa Golden Gate en la Internet: [www.nps.gov/goga/park-labs](http://www.nps.gov/goga/park-labs). Localice la sección titulada ¿Puede USTED USAR una clave de plantas dicotómica?

A cada paso en una clave dicotómica se le pide que escoja entre \_\_\_\_\_ para la planta que usted está tratando de identificar.



## Planta Misteriosa #1

¿Qué es una hoja simple? \_\_\_\_\_

¿Cuál es el nombre común de esta planta? \_\_\_\_\_



## Planta Misteriosa #2

¿Qué es una planta inflorescente? \_\_\_\_\_

¿Cuál es el nombre de esta planta en Latín? \_\_\_\_\_



## Planta Misteriosa #3

¿Qué son rizomas? \_\_\_\_\_

Dibuje una ilustración de esta planta al dorso de esta página.



## Planta Misteriosa #4

¿Qué son hojas disecadas o diseccionadas? \_\_\_\_\_

¿De qué familia es miembro esta planta? \_\_\_\_\_

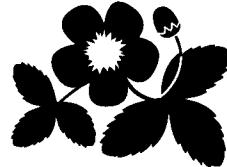


## Planta Misteriosa #5

¿Qué es un pedúnculo? \_\_\_\_\_

¿En qué parte del mundo se origina esta planta?  
\_\_\_\_\_

# 神秘植物記錄表



- 請造訪金門國家康樂區的國家公園實驗室網站：  
[www.nps.gov/goga/parklabs](http://www.nps.gov/goga/parklabs).
- 找到標示“你能否使用一個二叉式植物檢索表？”(Can YOU Use a Dichotomous Plant Key) 的段落

在一個二叉式檢索表中，每個步驟會要求您在 \_\_\_\_\_ 兩者中  
選擇您想辨識的植物。



## 神秘植物一號

什麼是單葉？\_\_\_\_\_

這種植物的俗名是什麼？\_\_\_\_\_



## 神秘植物二號

什麼是花序？\_\_\_\_\_

這種植物的拉丁名是什麼？\_\_\_\_\_



## 神秘植物三號

什麼是根莖？\_\_\_\_\_

在本頁背面繪出這種植物。



## 神秘植物四號

什麼是多裂葉？\_\_\_\_\_

這種植物屬於哪一科？\_\_\_\_\_



## 神秘植物五號

什麼是花梗？\_\_\_\_\_

這種植物原來產自世界上哪一個地區？  
\_\_\_\_\_

# O Invasive Plant Removal & Monitoring

## SUMMARY

Students learn to compare the ecological roles of indigenous and exotic plant species in an ecosystem, and to assess the impact of removing invasive plants based on interdependencies within the system. They use math and estimation skills to complete GGNRA Work Performed Data Sheets and to estimate the total people-hours it will take to weed an area of the park. Students come to recognize the important role of volunteers in national parks.

## TIME

2.5 hours

45 minutes for preparation

## MATERIALS

- World map and dry-erase markers
- Restoration Cycle (visual aid)
- Photomonitoring example
- Weeding priority boards
- Clipboards
- Digital cameras and diskettes
- Small whiteboard & dry-erase marker
- Plant species cards
- Journal entry questions
- Diagram of the photomonitoring points and a list of photo coordinates (NPS Natural Resources will provide)
- GGNRA Work Performed Data Sheet (NPS Natural Resources will provide master copies)
- Compasses
- Vegetation quadrat
- Gloves
- Picks
- Pencils
- Meter rollers
- Trash bags

## Program

### Welcome - 10 minutes

Park staff welcome students back to the park. A few students share questions from their journals. (These questions are used as discussion topics during the station rotations.) The class discusses key concepts of invasive plants, quantitative monitoring, and qualitative monitoring. Students offer their ideas of what these concepts mean. Park staff use the restoration cycle visual aid to illustrate how today's projects relate to other work the students have done in the park.

### **Introduction - 15 minutes**

#### Yurt

This activity serves as an “ice-breaker” and demonstrates the concept of interdependence. Park staff assign ecosystem “roles” to the students, either verbally or by handing out cards: bumblebee, yarrow, sand, carbon, rain, wind, gopher, poppy, sun, etc. Students announce their role and whether they are a biotic (living) or abiotic (non-living) part of the ecosystem. Park staff ask every other student in the circle to turn and face the outside (one staff member joins the students if there is an odd number). Students then become a yurt (a round, self-supporting structure) by holding hands or linking at the elbows, leaning back with their arms in front of them, and finding balance. The yurt illustrates the delicate balance in any ecosystem.

Park staff take the role of invasive species, attempting to break the balance of the ecosystem by pulling the students’ hands apart. Some sections stick together and others split apart, but the overall balance of the structure is broken. Students discuss the interdependence of the biotic and abiotic elements of an ecosystem, and how invasive plants affect the interdependencies. Can a yurt support itself in two or more separate pieces? How was the yurt affected when the interdependencies were broken? How is this a model of nature? How do invasive plants affect an ecosystem?

#### Map

Park staff divide the students into 6 groups. Each group receives a plant species card. Each group studies its card and determines if its plant should be removed from the restoration area. The group creates an argument for or against the plant species being removed. Groups present their arguments to the class. During the presentations students show where their plant is from using the world map and dry-erase markers. Note that many invasive plants come from places with climates similar to California’s.

Discussion questions:

- ▶ How did invasive plants get to California?
- ▶ Is it possible for California native plants to grow invasively?
- ▶ Under what circumstances?

### **Stations - 25 minutes each station x 4 stations = 2 hours**

Students cycle through 4 stations with nursery staff (see station instructions below).

### **Conclusion - 10 minutes**

Students gather in a large group. Park staff thank the class for their hard work and explain the importance of volunteers working on restoration projects in GGNRA.

Students are a part of a community of people from around the world who have contributed to habitat restoration in the park. Humans are a part of the complex system of interdependencies of the natural world.

### **Journal**

Students complete the questions as homework or in class.

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## **Station Guidelines**

### **STATION I - VEGETATION MONITORING**

#### **Procedures:**

- ▶ Park staff introduce the station by discussing the fragility of an ecosystem and the effects of human impact on it. Park staff ask the students to think about the background reading that explained different types of monitoring. How might the quadrat be used for monitoring? Do you think it is for qualitative or quantitative monitoring? (Quantitative)
- ▶ Park staff hand out a quantitative monitoring log to each student.
- ▶ A student tosses the quadrat into the area to be monitored.
- ▶ The group counts the number of different species growing within the quadrat. Using the plant key and the visual aids, students identify the species and determine if they are indigenous or exotic. Students agree on an estimation of the percent of the quadrat area that each species covers. If the students have difficulty estimating percent cover, they may draw some examples on the whiteboard (a pie chart of 50 percent, 30 percent, 10 percent, etc.).
- ▶ One student records on the whiteboard the numbers and percentages that are found.
- ▶ Students toss the quadrat and repeat the data gathering process at least three times.
- ▶ Some questions for discussion:

Is it better to have some bare ground or total plant cover inside the quadrat? (Bare areas can be a natural part of a healthy, evolving system. The soil is an abiotic component of the ecosystem; the plants and the soil are interdependent.) What is monoculture? Have we found any monocultures within the quadrat? Is an ecosystem with a

monoculture or a high diversity of plants healthier? Why? What can you predict about insect and animal populations from the information regarding plant cover? How many quadrats would you have to analyze to get a good representation of the restoration site as a whole?

## **STATION 2 - PHOTOMONITORING**

### **Procedures:**

- ▶ Park staff familiarize the students with proper compass use. If there are students who have used a compass before, they should help their classmates who are less familiar with it. The students can begin by learning to face north. Students line up the "N" on the dial of the compass with the black arrow (called the "travel" or "directional" arrow) on the face of the compass. Holding the compass flat and with the directional arrow pointing in front of them, the students spin slowly around until the red end of the suspended needle falls within the red outline of an arrow. (This is called "putting the red in the shed.") Once the red is in the shed, they are facing north.
- ▶ Park staff demonstrate the use of the digital camera. Students are warned not to drop the camera as it is very fragile and will break if dropped. (It is best for them to put the strap around their necks when they are using it.)
- ▶ One student uses the diagram with the monitoring points to lead the group to the first monitoring point.
- ▶ A second student uses the compass and the list of photo coordinates to line up the angle for the first photo.
- ▶ A third student takes the photograph and a fourth student completes the photomonitoring log.
- ▶ The remaining students are responsible for agreeing on the angle for each photo, guiding the photographer, and collaborating on the correct information for the photomonitoring log.
- ▶ Students repeat the photomonitoring for all the monitoring points and coordinates, shifting responsibilities for each photo.

- ▶ Some questions for discussion:

Why are the photographs taken from these positions? (What is the logic behind the positioning? What features are included/excluded from the photos?) What can you predict about insect and animal populations from the information you are gathering regarding the appearance of the restoration site? How many years' worth of photos are necessary to get a good picture of any trends in the restoration site? Are there any drawbacks to photomonitoring? (Varying quality of photos, inexact angles, photos taken at different times of day/year.) What are some ways that photomonitoring benefits a restoration project? (Brings restoration to life for interested parties: new employees, funders, people who cannot see the project in-person).

### **STATION 3 & 4 - INVASIVE PLANT REMOVAL**

#### **Procedures:**

- ▶ Park staff show students the boundaries of the weeding area, and an example of the invasive species to be removed. They point out any indigenous plants in the area that are endangered or especially delicate; removal of invasive species in the field is important but students must still remember to preserve the indigenous plants in the area. Students will be more likely to move carefully through plant habitat and remove invasive plants conscientiously if they have some understanding of the importance and fragility of the indigenous plants in the area.
- ▶ Before weeding, park staff give a careful safety demonstration with any tools that the group will use. Tools will be collected from any student who is using them in a way that endangers him/herself, other students, or staff. Students who are not using picks or weed wrenches safely can help weed by hand or take responsibility for bagging weeds and consolidating piles.
- ▶ Some discussion questions for the weeding stations:

What do you predict will happen in this ecosystem now that the invasive plants are removed? Can you describe the interactions between the indigenous plants and the invasive plants? (The invasive plants crowd the native plants, limit their growth and sometimes kill them.) Is it better to remove the roots of one plant or pull the top off of ten plants? (Remove the roots.) Has this species gone to seed? (If so, ensure that the seeds are being piled up with the weeds, not spread around the site.) Have you seen any of these plants before?

- When weeding is complete, students discuss the importance of keeping accurate records of work that was accomplished. Students should complete the GGNRA Work Performed Data Sheet.
- During the last five minutes of the station, students work together on the math problem described below.

**Group Math Problem:**

Park staff pose the following question and ask students what information they need to find the answer. As they call out the information they need (size of area weeded today, number of students weeding, etc.), a volunteer writes the information on the whiteboard. If necessary, the group can draw a diagram. Students create an equation to calculate the answer (the equation should come from the students, NOT from the park staff).

**Question:** You are the natural resources manager for a large park. You and your team have determined that invasive plants are severely disrupting the ecosystem of a 25-acre area of the park. You need to recruit volunteers and plan work days to accomplish the enormous task of removing the invasive plants. Based on your experience today, how many people-hours (1 person doing 1 hour of work) do you estimate will be required to accomplish the weeding?

**Sample Problem-solving Method:** (Students may reach the answer in a variety of ways; park staff will let them follow their instincts.)

Determine the area of the site the group weeded today by multiplying the length times the width. (The students should measure the length and width with the meter wheel.) For example, if width is 40 meters and length is 30 meters, area equals  $40 \text{ meters} \times 30 \text{ meters} = 1,200 \text{ square meters}$ .

Convert the area of the site from square meters into acres (4,047 square meters = 1 acre). For example, let Y equal the area of the site in acres:

$$4047 \text{ sq. meters} \div 1200 \text{ sq. meters} = 1 \text{ acre} \div Y \text{ acres}$$

$$4047 \times Y = 1 \times 1200$$

$$Y = 1200 \div 4047$$

$$Y = .3 \text{ acre}$$

Calculate the number of people hours it took to weed the site today.  
For example, 12 students x .3 hours (20 minutes) = 4 people-hours

Calculate the number of people hours for the 25-acre site. It took 4 people-hours to weed .3 acres; how many people hours will it take to weed 25-acres. Let Z equal the number of people hours required to weed all 25 acres.

$$Z \text{ people-hours} \div 4 \text{ people-hours} = 25 \text{ acres} \div .3 \text{ acres}$$

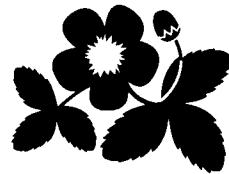
$$Z \div 4 = 83.33$$

$$Z = 83.33 \times 4$$

$$Z = 333.2 \text{ people hours}$$

**Solution:** 333.2 people-hours will be required to get all the weeding done (33 volunteers who each work a little over 10 hours).

# Invasive Plant Removal & Monitoring



## Journal Entry

1. Why do we remove invasive plants?

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2. What would happen to this ecosystem if we left the invasive plants alone? Do you think we are interfering with nature? Why or why not?

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3. Predict the impact of the work you did in the park today. How have you changed the park? Is this a lasting change? What do you predict will happen next year?

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4. What question do you have about the work you and your class did today?

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# Remoción y Monitoreo de Planyas Invasoras



## Preguntas para el Diario

1. ¿Por qué removemos las plantas invasoras?

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2. ¿Qué le ocurrirá a este ecosistema si no tocamos las plantas invasoras? ¿Cree usted que estamos interfiriendo con la naturaleza? ¿Por qué sí, o por qué no?

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3. Prediga el impacto que su trabajo tuvo en el parque el día de hoy. ¿Cómo ha cambiado usted el parque? ¿Será duradero este cambio? ¿Cuál es su predicción sobre lo que ocurrirá el año próximo?

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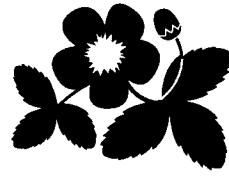
4. ¿Cuáles preguntas tiene usted sobre el trabajo que realizaron usted y su clase?

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# 侵佔性植物的清除 和監視



日誌項目

1. 我們為什麼要清除侵佔性的植物？

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2. 如果我們不清除這些侵佔性的植物，這個生態系統會發生什麼？你認為我們在干擾大自然嗎？為什麼？為什麼不？

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3. 預測你今天在公園內所做的工作會產生什麼作用。你如何改變了公園？這是一個永久性的改變嗎？你能預測明年會發生什麼事嗎？

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4. 你對自己和同學今天所做的工作有什麼問題？

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# ● Community Forum Role Play: The Case of the Vacant Lot

## SUMMARY

Students participate in a debate regarding the fate of a fictional vacant lot in the neighborhood of their school. They come to understand many different players and views, and the Environmental Justice issues that need to be resolved for successful planning. Through role-play, students work as a team to design a plan that meets the needs of a diverse community.

## TIME

50 minutes

30 minutes for preparation

## MATERIALS

- The Case of the Vacant Lot
- Role cards
- Laminated site maps
- Dry-erase markers
- Journal entry

## ● Lesson

### Welcome - 5 minutes

Park staff remind the students that they have been studying environmental issues in GGNRA, a national park. There are similar environmental issues within the city, and even in the students' neighborhoods. Today's activity will help them understand the complexity of open-space planning in a city environment.

### Introduction - 5 minutes

Two students introduce the class to the day's activity. The students read aloud The Case of the Vacant Lot that describes a fictional but realistic scenario set in the neighborhood of their high school. The scenario involves a vacant lot for which four competing projects have been proposed. The volunteers read summaries of each competing project. After hearing about the competing projects, the class votes for their favorite option.

**Group Work - 15 minutes**

- ▶ Park staff explain to the students that they will now be asked to view the four proposals from someone else's perspective.
- ▶ The class divides into groups of 4 or 5 students. Each group receives a laminated site map, dry-erase markers, and role cards representing stakeholders in the vacant lot project.
- ▶ The role cards should be distributed carefully so that each group contains students representing a variety of roles.
- ▶ Students read their role card aloud to the rest of their group.
- ▶ Each group formulates a plan for the site that is acceptable to all the stakeholders in their group. The plan may or may not contain elements of the original four proposals.
- ▶ If the groups have trouble moving the discussion forward, park staff can assign any of the following responsibilities to group members: Leader, Scribe, Vote Manager, Plan Designer, Presenter.

**Presentations - 15 minutes**

Student groups describe which stakeholders were represented in their groups and present their final project plan to the rest of the class.

**Discussion - 10 minutes**

The class discusses the following two principles of Environmental Justice and how those principles relate to urban planning:

*Environmental Justice calls for universal protection from nuclear testing, and extraction, production and disposal of toxic/hazardous wastes and poisons that threaten the fundamental right to clean air, land, water, and food.*

Points for discussion: The creation of new jobs for the community must be weighed against the possible danger of pollution from the paper recycling plant; how do economic factors effect the location of businesses that create pollution?

*Environmental Justice demands the right to participate as equal partners at every level of decision making, including needs assessment, planning, implementation, enforcement, and evaluation.*

Points for discussion: Do all stakeholders have their voices heard? What causes some voices to be heard over others? What can be done to create more equity in the urban planning process?

Recall the Top Ten Environmental Rights lesson; how do the students' plans for the vacant lot support their list of Top Ten Environmental Rights?

**Journal**

Students complete journal entry as homework.

# The Case of the Vacant Lot

## Background Information

### SCENARIO:

Money has been allotted by the local government to begin work on the rehabilitation of an empty two-acre demolition site in our neighborhood. We are asking you, the local residents, to listen closely to the following four project proposals and vote on the proposal that you think will be the most valuable addition to the neighborhood.

### Community Recreation Center

With basketball courts, tennis courts, and a large conference room, this facility will provide a place for young people to spend time after school and for our local community groups to hold meetings, dances, and other large events.

### Native Plant Restoration Project

This project will bring people from the community together to return a small part of the area to what it was before the urban development of San Francisco. Young and old people will learn about our local natural history while they beautify a corner of our neighborhood.

### Paper Recycling Plant

Our neighborhood needs stronger recycling programs and more new jobs. A new paper recycling plant would provide both. Selling the land to a recycling corporation would bring money into the local economy and hundreds of our unemployed residents would have new, good-paying jobs available to them.

### Health Clinic

A new health clinic would bring low-cost medical care to our community. Services would include immunizations, prenatal care, private counseling, parenting courses, dental care, pregnancy testing, and STD prevention programs.

**PLEASE VOTE FOR THE PROJECT THAT YOU THINK WOULD MOST BENEFIT OUR COMMUNITY.**

# El Caso del Lote(Solar) Vacío

## Trasfondo

**ESCENARIO:** El gobierno local ha asignado dinero para comenzar el trabajo de rehabilitar un solar de dos acres de nuestro vecindario, que ha sido demolido. Le estamos pidiendo a ustedes, los residentes locales, que consideren cuidadosamente las cuatro siguientes propuestas para proyectos, y que voten por la propuesta que ustedes piensan será la aportación más valiosa a la comunidad.

**Centro de Recreación Comunitario** Con canchas de baloncesto, tenis, y una amplia sala de conferencias, estas instalaciones proveerán un lugar para que la gente joven pase el tiempo después de la escuela y para que grupos locales celebren sus reuniones, bailes y otros eventos grandes.

**Proyecto de Restauración de Plantas Nativas** Este proyecto reunirá a la gente de la comunidad para restablecer un área pequeña a cómo era antes del desarrollo urbano en San Francisco. Los jóvenes y los mayores aprenderán acerca de nuestra historia natural local a la vez que una esquina de nuestro vecindario será embellecida.

**Planta de Reciclar Papel** Nuestra comunidad necesita programas de reciclaje más efectivos y más empleos. Una nueva planta de reciclaje proveería ambas cosas. La venta del solar a una compañía de reciclaje le traería dinero a la economía local y cientos de nuestros residentes, que están desempleados, obtendrían trabajos buenos y bien pagados.

**Clínica de Salud** Una nueva clínica de salud le ofrecería servicios médicos a costo moderado a nuestra comunidad. Dichos servicios incluyen vacunación, cuidado pre-natal, consejería privada, educación a los padres, cuidado dental, pruebas de embarazo y programas de prevención de enfermedades trasmitidas sexualmente (STD).

**POR FAVOR VOTE POR EL PROYECTO QUE USTED CONSIDERA MÁS BENEFICIOSO PARA NUESTRA COMUNIDAD.**

# 空地利用的個案討論

## 背景資料

### 情況：

當地政府已撥款，打算在我們附近的一塊兩英畝建築物業已拆毀的空地上開始改造工作。我們現在請身為當地居民的您，仔細聽取下面的四個計劃方案，並選出你認為對鄰里社區最有價值的方案。

### 社區康樂中心

這個設施內備有籃球場、網球場和一個大型會議室，可以提供年輕人下課後的正當去處，同時提供當地社區團體用以集會、舉辦舞會和其他大型活動的場所。

### 本地植物重建計劃

這個計劃將結合社區群眾，將這一小塊地區恢復三藩市開發之前的原有風貌。無論男女老少，在合力美化我們的鄰里之餘，還可以附帶瞭解本地的自然歷史。

### 廢紙回收廠

我們的社區需要更有效的回收計劃和更多的就業機會。新的廢紙回收廠是雙管齊下的解決方案。把土地賣給回收公司，可以為本地的經濟帶來足夠的財力，而我們數以百計的失業居民也能找到待遇良好的新工作。

### 衛生所

一家新的衛生所可以為我們的社區提供廉價的醫療服務。這些服務包括預防接種、產前檢查、私人諮詢、準父母課程、牙齒保健、孕期檢驗和性病防治計劃等。

請投票選擇你認為最能造福我們的社區的計劃。

# The Case of the Vacant Lot

## Stakeholder Role Cards

### THE PLAYERS:

#### The Environmental Action Team

You are the Director of a small non-profit agency located in San Francisco. Although you have only four staff people and fifty members, you are well respected by the community. You oppose the recycling plant because you feel that the city already has far too many industrial sites, and the high rate of diseases like emphysema and asthma in your neighborhood may be linked to industrial pollution. The new plant would create jobs for many unemployed, but you feel residents should not have to sacrifice the community's health for jobs.

#### The Mayor's Office

You are the Representative of the Mayor's Office. From your viewpoint, the restoration project will do very little for the local economy and for the residents as a whole. You support any plan to bring jobs to the city's neighborhoods and would like to boast about how San Francisco is the nation's champion recycling city. The recycling company is a very wealthy corporation that could bring valuable tax dollars to San Francisco.

#### Police Officer

You support the Community Center and Recreation Area. You believe that youth violence can be curbed if the community would put more resources toward giving young people healthy recreational opportunities. If the recreation center is built, you intend to start a midnight basketball league to help keep youth off the streets at night.

#### The Solid Waste Management Program

As the Director of the Solid Waste Management Program, your job is to reduce the amount of solid waste produced by San Francisco. You would like to see the recycling plant built because without it, there is no way San Francisco will reduce its waste 50 percent by a mandated target date. Your program's reputation and funding depend on meeting this goal.

### Dog Owner

You walk your dog every day in the neighborhood and would like a place for your dog to run. There are very few areas in this city where dogs are permitted to run freely without a leash. Dog walking provides exercise for you and your dog, and you know many elderly people whose only exercise is walking their dog. You will support the native plant restoration area if it includes an area for dogs to run off-leash, however, you prefer that the entire site be made into a dog park.

### Historian & Director of the Center for Indian Culture

You are aware of the Ohlone Indian heritage that has all but disappeared in the Bay Area, and you feel that the indigenous plant restoration project would pay tribute to a neglected part of local history. Native plants that were an important part of the indigenous culture of the area could be grown in the restoration area, and people could learn about their traditional uses. You would also like to see some archeological work done at the site, with hopes of finding some sacred artifacts and remnants of the seasonal camps of the Ohlone.

### Wheelchair User

You are an outdoorsperson who uses a wheelchair. You love to visit San Francisco's natural areas, but many of them are not wheelchair accessible because they do not contain paved pathways. You would like to be close to nature. You support the Native Plant Restoration Project if it is accessible to wheelchair users.

### UC Berkeley Ecologist

You support the Native Habitat Restoration Project. You are aware of the dwindling habitat for indigenous plants and wildlife. Even though the proposed site is extremely small, it will be an important educational tool to help the public understand the significance of genetic and plant diversity and the delicate balance of nature that must be restored for the health of all living things.

### The Eco Club President

You are the President of a nationwide environmental organization. You have over 150,000 members across the country and an operating budget of \$75 million. Your headquarters is in San Francisco but you

live in Marin County. You recognize the need for increased paper recycling services in the Bay Area. Paper recycling saves natural resources and keeps landfills from filling up.

Parent

You are the parent of three children. Your family does not own a car, therefore, services in other parts of the city are difficult for you to reach. You would support either the health clinic or the recreation center. You know that your children would benefit from either project.

Health Care Professional

You support the Health Clinic. Every day at the hospital across town where you work, you see people from your community being treated for problems that could be avoided if they had better access to health care. Immunizations, well-baby check-ups, and prenatal care at the new clinic would be far less expensive than treating the problems that result when people do not have access to this type of care. You know that many people in the community do not have cars and getting to health clinics and hospitals in other areas of the city is very difficult for them.

Citizens for Economic Development

You are the head of a group of unemployed residents trying to bring new jobs and steady paychecks into the community. Your community has suffered from poverty for too long, and it needs new businesses to bring economic life back into the area. The Community Recreation Center would employ some people but at relatively low wages. The health clinic would employ mostly skilled healthcare workers. You support the recycling plant because it would employ many local jobless people at livable wages.

Local High School Student

You are a local high school student. You came to the meeting today because you are interested in the future of your neighborhood. You are willing to listen to all the alternatives with an open mind and then give your opinion about how the vacant lot should be used.

# El Caso del Lote (Solar) Vacío

Tarjetas de Roles de los Promovientes

## LOS ACTORES:

El Equipo de Acción Ambiental Usted es el director de una pequeña agencia sin fines de lucro en San Francisco. Aunque usted solamente tiene cuatro empleados y 50 miembros, la comunidad respeta mucho su agencia. Usted se opone al proyecto de reciclaje porque considera que la ciudad ya tiene demasiados espacios industriales y la alta tasa de enfermedades en su comunidad, como la enfisema y el asma pueden estar relacionadas con la contaminación industrial. La nueva planta crearía empleos para muchos desempleados pero usted cree que los residentes no deben sacrificar la salud de la comunidad a cambio de trabajos.

La Oficina del Alcalde Usted es un Representante de la Oficina del Alcalde. Su opinión es que el proyecto de restauración no contribuirá mucho a la economía local y no hará mucho por los residentes en términos generales. Usted apoya cualquier plan que traiga empleos a las comunidades de la ciudad y le gustaría promover el orgullo de que San Francisco es la primera en la nación entre las ciudades que reciclan. La compañía de reciclaje es muy rica y podría traer muchos dólares de los contribuyentes a San Francisco.

Oficial de la Policía Usted apoya el Centro Comunitario y el Área Recreativa. Usted cree que la violencia juvenil puede reducirse si la comunidad invierte más recursos para proveerle a los jóvenes oportunidades recreativas saludables. Si se construye el centro recreativo usted está dispuesto a iniciar un liga de baloncesto nocturno para ayudar a sacar la juventud de la calle durante la noche.

Programa para el Manejo de Desperdicio Sólidos Como Director del Programa para el Manejo de Desperdicio Sólidos su trabajo es reducir la cantidad de desperdicios sólidos producidos por San Francisco. A usted le gustaría que se construyera la planta de reciclaje porque sin ésta no hay manera que San Francisco pueda reducir sus desperdicios un 50 por ciento antes de la fecha ordenada legalmente. La reputación

y los fondos de sus programa dependen de que se logre esta meta.

Dueño de Perro Usted pasea su perro todos los días por el vecindario y le gustaría tener un lugar donde su perro pueda correr. Hay muy pocas áreas en la ciudad donde se permite a los perros correr libremente sin cadena. Pasear al perro hace que usted y su perro hagan ejercicio y usted conoce mucha gente mayor cuyo único ejercicio es pasear a sus perros. Usted apoya la restauración del área de plantas nativas si incluye un área para que los perros corran libremente, sin embargo usted preferiría que toda el área fuera usada como parque para perros.

Historiador y Director del Centro de Cultura de Indios Americanos Usted está consciente de que el patrimonio de los Indios Ohlone casi ha desparecido del Área de la Bahía, y usted piensa que el proyecto de restauración de plantas indígenas sería un justo tributo a una parte olvidada de la historia local. Plantas nativas que fueron parte importante de las culturas indígenas del área podrán ser cultivadas en el área de restauración y la gente podría aprender acerca de sus usos tradicionales. A usted le gustaría también ver que se haga algún trabajo arqueológico en el lugar, con la esperanza de hallar algunos objetos sagrados y residuos de los campamentos temporeros de los Ohlone.

Usuario de Silla de Ruedas Usted es una persona que está en silla de ruedas pero disfruta del aire libre. Le encanta visitar las áreas naturales de San Francisco pero muchas de estas no pueden acomodar sillas de rueda porque no tienen veredas pavimentadas. A usted le gustaría estar cerca de la naturaleza. Usted apoyó el Proyecto de Restauración de Plantas Nativas si lo hacen accesible a personas en sillas de rueda.

Ecólogo de la Universidad de Berkeley Usted apoya el Proyecto de Restauración de Plantas Nativas. Usted está consciente de cómo va reduciéndose el hábitat de plantas indígenas y vida silvestre. Aunque el lugar propuesto es muy pequeño, el mismo sería un importante recurso educativo para ayudar al público a entender el significado de la diversidad vegetal y genética y el delicado balance de la naturaleza que debe ser restablecido para la salud todas las cosas vivientes.

El Presidente del Club Ecológico Usted es el Presidente de una organización ambiental nacional que tienen más de 150,000 miembros por

todo el país, y opera con un presupuesto de \$75 millones. Sus oficinas principales están en San Francisco pero usted vive en el Condado de Marín. Usted reconoce la necesidad de más servicios de reciclaje de papel en el área de la Bahía. El reciclaje de papel conserva los recursos naturales y evita que se llenen los basureros.

Padre Usted es el padre de tres chicos. Su familia no tiene automóvil por lo que le resulta difícil llegar a otras parte de la ciudad para obtener algunos servicios. Usted apoyaría la clínica de salud al igual que el centro recreativo. Usted sabe que sus hijos se beneficiarían de cualquiera de estos proyectos.

Profesional de Servicios de Salud Usted apoya la clínica de salud. Todos los días, en el hospital que queda al otro extremo de la ciudad, usted ve gente de su comunidad recibiendo tratamiento para problemas que podrían prevenirse si hubiese mayor acceso a servicios médicos. En la nueva clínica el costo de servicios como vacunas, cuidado médico infantil y pre-natal sería menor que atender problemas causados porque la gente no tiene acceso a este tipo de servicios. Usted sabe que mucha gente de la comunidad no posee automóvil y les resulta muy difícil llegar a clínicas de salud y hospitales que están en otras áreas de la ciudad.

Ciudadanos en pro del Desarrollo Económico Usted encabeza un grupo de residentes desempleados que están tratando de traer nuevos empleos y salarios estables a la comunidad. Su comunidad ha sufrido la pobreza por mucho tiempo y necesita nuevos negocios para recobrar la vitalidad económica del área. El Centro de Recreación Comunitario emplearía algunas personas pero con salarios bajos. La clínica de salud le daría empleos principalmente a trabajadores de la salud diestros. Usted apoya la planta de reciclaje porque emplearía más de la gente desempleada y con mejores sueldos.

Estudiante de Escuela Superior de la localidad Usted es un estudiante local de escuela superior. Usted vino a la reunión hoy porque está interesado en el futuro de su vecindario. Usted está dispuesto a considerar todas las alternativas con una mente abierta para entonces dar su opinión sobre cómo debe de utilizarse el solar vacío.

# 空地利用的個案討論

## 利益相關者意願卡

### 參與者：

#### 環保人士

你是三藩市當地一家小型非營利機構的主任。雖然你只有四名僱員和五十位會員，在本社區你是一位得高望重的人物。你反對建造回收廠，因為你認為三藩市已經有太多的工業區，而且工業污染疑似造成當地如肺氣腫和氣喘等高患病率的主因。新的工廠固然可以為很多失業的人創造新工作，但你認為居民不該為了工作而犧牲掉社區人的健康。

#### 市長辦公室

你身為市長辦公室的代表。就你的個人觀點而言，重建計劃對當地經濟以及整體居民來說助益不大。但你支持任何能為三藩市創造工作機會的計劃，並想宣傳三藩市如何成為全個的冠軍回收市。回收公司財源豐富，可以為三藩市帶進數量可觀的稅金。

#### 警員

你支持社區活動中心和康樂區。你相信如果社區把資源放在提供給年輕人更多的康樂機會，就可防治年輕人的暴力犯罪。如果要籌建一個康樂中心，你打算組織一個午夜籃球隊，好讓年輕人夜晚不在街上遊蕩。

#### 固體廢物管理計劃

身為固體廢物管理計劃的主任，你的職責是減少三藩市製造的固體廢棄物。你希望見到回收廠的順利建造，因為若沒有它，三藩市不可能在規定的期限之內把廢棄物的量減少百分之五十。你的計劃是否獲得迴響和金錢上的資助，全靠它是否能達成預期的目標。

#### 寵物狗主人

你每天在附近遛狗，希望你的狗有一個自由奔跑的地方。三藩市大部份的地方都不准把狗鍊子拿掉。遛狗對你本身還有你的狗都是很好的運動，你也認識很多老人，他

們唯一的運動就是遛狗。如果本地植物的重建區計劃包含一個讓狗自由走動的特區，你就會支持這項計劃。不過，你希望把這一整片地都變成一座遛狗公園。

#### 歷史學家和印第安文化中心主任

你發覺 Ohlone 印第安人的傳統幾乎在灣區銷聲匿跡。你認為本地植物重建計劃將可對當地歷史不受重視的一面有所貢獻。重建區應該培育佔當地文化很重要一部份的本地植物，讓人們明白這些植物的傳統用途。你也希望見到設立一些古代文物的陳列所，供人鑑賞 Ohlone 人隨著季節而遷移的營地中所用的宗教儀式工藝品和遺物。

#### 輪椅殘障人士

你是一位愛好戶外活動的殘障人士，靠輪椅行動。你喜歡遊訪三藩市的自然區，但是很多地方都不適合座輪椅的人進出，因為沒有鋪設輪椅專用步道。你希望接近大自然。如果本地植物重建計劃可以提供坐輪椅的殘障人士更多便利的設施，你就會支持它。

#### 柏克萊大學生態學家

你支持本地重建棲息生態專案。你發覺本地植物和野生物的棲息地面積逐漸減小。即使提案中的重建區並不大，它仍然能夠起到很重要的教育作用，幫助大眾瞭解遺傳和植物多元化，及為了所有生物的健康著想，我們必須恢復人類與自然之間的微妙平衡的重要性。

#### 生態保育俱樂部主席

你是一個全國性的環保組織的主席。你在全國各地擁有超過十五萬名會員，以及美金七千五百萬推行環保工作的預算。你們的總部設在三藩市，但是你住在馬連縣。你認為灣區有必要加強廢紙回收的服務。廢紙回收可以節省自然資源，免得垃圾場的垃圾堆積如山，造成垃圾無處可去。

#### 家長

你是三名子女的家長。你們家不開車，因此，你很難享用三藩市其他地區的服務。你會支持蓋衛生所或康樂中心。你知道子女會因任一設施的設立而受益。

### 健保專業人士

你支持衛生所。你每天在本市另一頭的醫院裡工作，都能看到你社區裡的人前往就醫。但是，如果附近有方便的醫療服務，就能避免大老遠跑去醫院看病的麻煩。在新診所接受預防接種、寶寶健康檢查和產前檢查，要比沒有這種醫療服務而要到他處就醫便宜得多。你知道社區裡的很多人都沒有車，要到市內其他地區的診所或醫院看病並非易事。

### 主張經濟發展的市民

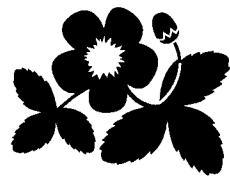
你是一群失業居民團體的領袖，企圖為社區創造新的工作機會和穩定的收入。你的社區長久以來一直受到貧窮的困擾，需要靠新的商業活動把經濟活力帶回此地。社區康樂中心會雇用一部份人，但薪資並不高。而衛生所雇用的大部份都是訓練有素的醫護人員。你支持回收廠的計劃，因為它將以足夠養家活口的報酬，雇用很多當地的失業人士。

### 本地中學生

你是一名本地的中學生。你今天來參加這個會議，是因為你很關心社區的未來。你願意抱持客觀的心態來聽取所有改善本社區的可能方案，然後提出你個人利用這塊空地的意見。

# The Case of the Vacant Lot

Journal Entry



1. Explain your personal point of view on The Case of the Vacant Lot.

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2. How does your personal view address principles of Environmental Justice?

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3. What question do you have about city planning in regards to open space?

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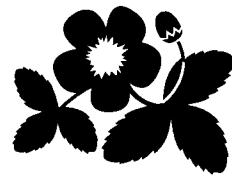
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# El Caso del Lote (Solar) Vacío

Notas para el Diario



1. Explique su punto de vista personal sobre El Caso del Lote (Solar) Vacío.

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2. ¿Cuál es visión personal acerca de los principios de Justicia Ambiental?

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3. ¿Qué preguntas tiene usted sobre cómo se relaciona la planificación en la ciudad con los espacios abiertos?

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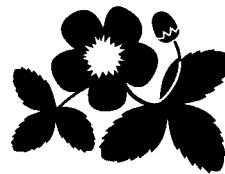
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# 空地利用的個案討論

日誌項目



1. 解釋你個人就空地利用個案的觀點。

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2. 你的個人觀點如何符合環境正義原則的要求？

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3. 你對於有關空地的都市規劃有什麼問題？

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# ● Habitat Restoration Around the World

## **SUMMARY**

Students are introduced to habitat restoration projects around the world. They compare these projects with each other, and with the restoration projects in the Golden Gate National Recreation Area.

## **TIME**

50 minutes

30 minutes for preparation

## **MATERIALS**

- ▶ Four articles on restoration projects (These can be found using a simple Internet search)
- ▶ Discussion questions

# ○ Lesson

## **Introduction - 5 minutes**

Teacher explains to the class that the park restoration project they have been working on fits into a much larger picture of restoration projects worldwide. Today students will learn about some other restoration projects and have a chance to compare them to Golden Gate National Recreation Area's restoration project. Each student is given one of the four articles on restoration projects.

## **Reading - 5 minutes**

Students read their articles.

## **Group Work - 15 minutes**

- ▶ After reading the articles, students divide into groups by article.
- ▶ In their groups, students discuss their article and answer questions 1 to 7.

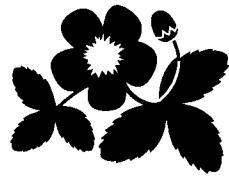
## **Group Work - 15 minutes**

- ▶ Students “jigsaw”: Form new groups of 4 in which one representative from each of the original groups is present in the new group.
- ▶ In the new groups, students present the restoration project they read about.
- ▶ Students answer questions 8 to 10.

**Discussion - 10 minutes**

- ▶ Student regroup into a single unit.
- ▶ They discuss the purpose of restoration. In Golden Gate National Recreation Area, the goal of restoration is to increase plant and animal diversity. Is this a valid goal? How does it compare to the goals of the other restoration projects?
- ▶ Considering other environmental problems, how important is restoration?
- ▶ Who benefits from restoration of natural areas?

# Restoration Around the World



## Discussion Questions

### TO BE DISCUSSED IN FIRST GROUP:

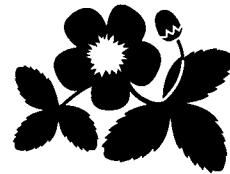
1. What is the goal of this restoration project?
2. Who or what will benefit from this project, if successful?
3. Does this project benefit people of all economic classes? Why or why not?
4. Who is sponsoring or funding this restoration work?
5. Does this project show collaboration between interest groups or is it a one-sided effort?
6. Who might be against this project? Who or what does it affect negatively?
7. What is your opinion of this project?

### TO BE DISCUSSED IN SECOND GROUP:

8. Do you think one of these projects is more important or valuable than another?
9. If you had to choose only two of the four projects, which two would you choose? Why?
10. Compare these projects to the restoration project you have been working on in the Golden Gate National Recreation Area. Which is more valuable? Why?

# La Restauración en el Mundo

Preguntas sobre Opiniones



PARA SER CONTESTADAS POR EL PRIMER GRUPO:

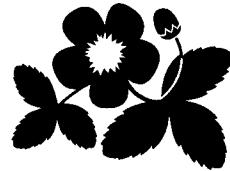
1. ¿Cuál es la meta de este proyecto de restauración?
2. ¿Quiénes o qué ha de beneficiarse por este proyecto, de tener éxito?
3. ¿Beneficia este proyecto a personas de todas las clases sociales? ¿Por qué sí o por qué no?
4. ¿Quién está patrocinando o proveyendo fondos para este trabajo de restauración?
5. ¿Demuestra este proyecto que existe colaboración entre grupos de interés, o es un esfuerzo de algunos solamente?
6. ¿Quién querría oponerse a este proyecto? ¿A quiénes o a qué afecta este negativamente?
7. ¿Cuál es su opinión sobre este proyecto?

PARA SER CONTESTADAS POR EL SEGUNDO GRUPO:

8. ¿Piensa usted que uno de estos proyectos es más importante o más valioso que los otros?
9. ¿Si tuviera usted que seleccionar dos de los cuatro proyectos, cuáles escogería usted? ¿Por qué?
10. Compare estos proyectos con el proyecto de restauración en el cuál usted ha estado trabajando en el Área Nacional Recreativa Golden Gate. ¿Cuál es más valioso? ¿Por qué?

# 全球各地的重建工作

討論問題



## 第一組討論內容：

1. 這項重建計劃目的何在？
2. 如果這項計劃成功，受益者會是什麼（人）？
3. 這項計劃是否造福所有經濟階層的人？為什麼？為什麼不？
4. 誰在贊助或資助這項重建工作？
5. 這項計劃是否展現了利益團體間的合作或只是單方面的努力？
6. 誰可能反對這項計劃？它會對誰或什麼帶來負面影響？
7. 你對這項計劃有何意見？

## 第二組討論內容：

8. 你是否認為這些方案中，有一個計劃比其餘的計劃重要或有意義？
9. 如果你只能選擇四個方案中的兩個，你會選擇哪兩個？為什麼？
10. 比較這些計劃與你在金門國家康樂區所參與的重建計劃。哪一個比較有意義？為什麼？

# Rubric

## Invasive Plant Removal & Monitoring

### Science (Interdependence)

*Needs Improvement:* Students do not understand the interrelationship of biotic and abiotic elements of the environment.

*Good:* Students grasp the complexity of an ecosystem's web of life but do not fully understand their own impact on that ecosystem.

*Excellent:* Students grasp the complexity of an ecosystem's web of life and show a clear awareness of their own impact on that ecosystem.

### Math (Person-hours)

*Needs Improvement:* Students cannot estimate the number of people-hours it will take to complete a project without extensive help from the facilitator.

*Good:* Students can estimate the number of people-hours it will take to complete a project but need prompting from the facilitator.

*Excellent:* Students can estimate the number of people-hours it will take to complete a project with no help from the facilitator.

### Environmental Justice (Equal access)

*Needs Improvement:* In planning activity, students do not attempt to include others' views and do not attempt to see issue from other points of view.

*Good:* In planning activity, students are aware of the importance of including many voices in planning a public space.

*Excellent:* Students are able to see more than one side of the issue and attempt to compromise between as many different interests as possible.

### Life Skills (Cooperative Learning)

*Needs Improvement:* Students show incomplete interaction, often ignore comments, group efforts are easily sidetracked, some members uninvolved in group.

*Good:* More than half the members are actively involved, rarely are comments ignored, rarely stray from topic.

*Excellent:* All students participate equally, actively listen to one another, show respect for ideas, stay on task.